UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/894,066	06/28/2001	Hamid A. Abbasi	GTI-1450	6574

7590 10/07/2003

Mark E. Fejer
Pauley Petersen Kinne & Fejer
Suite 365
2800 West Higgins Road
Hoffman Estates, IL 60195

EXAMINER	
SODERQUIST, ARLEN	

ART UNIT	PAPER NUMBER
1743	3

DATE MAILED: 10/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/894,066	ABBASI ET AL.
	Examiner	Art Unit
	Arlen Soderquist	1743

-- The MAILING DATE of this communication appears on th cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14 and 16* is/are rejected.

7)☒ Claim(s) *15* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 June 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *2* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the combustion chamber and control means of claim 13 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

2. Claim 11 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 11 the controlled sensor flame must have sufficient oxygen to allow the flame to be controlled and thus the claim lacks sufficient structure to allow a controlled flame.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Forbes or Drasek in view of Isenberg and Murase (US 4,466,943).

In the patent Forbes teaches a flame monitoring method and device in combustion of hydrocarbon fuel. The device used for monitoring flame, includes a sensor for reacting to electromagnetic radiation discharged from the flame of transient species (e.g., OH, CH) having narrow wave length, sensor for reacting to electromagnetic radiation discharged from the flame of each non-transient species (e.g., H_2O, CO_2) having narrow wave length, respectively, and a

CPU for processing the outputs from the sensors to obtain air-fuel ratio, for stoichiometry of combustion process to improve combustion efficiency and decrease pollution. Forbes does not teach monitoring of a controlled flame that is different from the combustion flame.

In the paper Von Drasek teaches industrial combustion monitoring using optical sensors. With more strict environmental regulations, optimizing the combustion process to reduce pollutant emissions and increase fuel efficiency is a major objective for manufacturers. Promotion of oxy-fuel (substitution of air with high purity O_2) combustion is one alternative technology demonstrated as a way for manufacturers to meet their environmental objectives. Despite the benefits oxy-fuel combustion can offer, further optimization using monitoring and control techniques is still needed. A novel method to monitor and control oxy-fuel burners by strategic placement of optical sensors is discussed. Sensors are integrated into an industrial oxy-fuel burner capable of withstanding harsh environments. Radiation from the flame at selected wavelength regions is collected by fiber optics attached to the burner and transported to a miniaturized personal computer-based spectrometer. Spectral information obtained is used to construct a neural network (NN) model that relates the real-time signal collected to burner operating parameters such as, stoichiometry, power, and fuel and/or oxidizer changes. This processed information from the NN can be used in a control-loop to adjust and optimize combustion parameters or alert operators of potential burner problems. Examples of this technology on Air Liquide's pilot furnaces in the US and France and from an industrial glass melting tank are presented. The potential of the sensor and NN approach is demonstrated for conventional (pipe-in-pipe) burner and an advanced wide flame burner. Results showed that stoichiometry and power changes can reliably be detected using optical sensors. In addition, an example demonstrating the method on oxy-fuel oil flames to monitor oil atomization quality and stoichiometry is presented. does not teach monitoring of a controlled flame that is different from the combustion flame. Von Drasek does not teach monitoring of a controlled flame that is different from the combustion flame.

In the paper Isenberg teaches combustion control with flames. A combustion control process and apparatus provides a reference flame of known or constant composition which is in ionic communication with the main flame which is to be controlled. Both the reference and main flames are supported by electrically insulated burner nozzles and the flames are in mutual

electrical communication through ionized gases. The potential difference is measured between the flames by way of the nozzles and is used in the air-fuel ratio adjustment of the main burner. The reference flame is of a predetermined constant composition, that is, it is generated by an ascertained air-fuel mixture, and the flame renders products of combustion with a constant oxygen content or an absence of oxygen. Moreover, in a calibrated system in which specific differences have been identified with specific main burner combustion conditions, the measured potential provides an instant readout of main burner status. It is possible to utilize a single reference flame to control two or more main burner flames. In figure 2, an application of the process and apparatus is illustrated in a combustion control system (51) having a combustion housing portion (53) with an exhaust end (55). At the opposite end of the body portion, at least one main burner means (57) is mounted so as to be electrically insulated from the reference flame nozzle means (59). Main burner (57) is associated with flame generation means consisting of fuel and air/oxygen supply means (63,65). Fuel is provided to the burner through control valve adjusting means (67,69) while the air passes through control valve adjusting means (71,73). Likewise, the reference flame nozzle is provided with fuel from supply means (75) through a control valve means (77,79) and with air or oxygen from supply means (81) through a control valve means (83,85). The reference flame nozzle can be configured to serve as a pilot flame for the main flame ignition. Suitable fuels for the reference flame (87) include carbon monoxide, hydrogen, methane, propane and butane. Since only a small reference flame is required, it is relatively easy to accurately measure the limited flows of fuel and air to the burner nozzle. One method of providing combustive agents for the reference flame consists of employing a water electrolysis cell which produces gases such as oxygen and hydrogen in stoichiometric proportions. In such a simple reference flame, the gas supply is safe, inexpensive and reliable. If, for example, the amount of oxygen supplied to the reference burner is sufficient to meet the stoichiometric requirements for the complete and efficient reaction of the fuel provided thereto, a known combustion product would be generated by the reference flame. Suitable control means (95) can be utilized to effect the modification of the air-fuel mixture of main burner. The control means is in communication with the measurement means and may include amplification and signal processing capabilities. The control means is also in electromechanical communication with control valves through which the air-fuel mixture of the

main burner is adjusted. In this manner, the air-fuel ratio of the main burner is adjusted until a predetermined difference is established between the main burner and the reference burner.

In the patent Murase teaches a flame photometric analyzer in which a sample gas is introduced into the flame formed by burning a fuel gas in the presence of a combustion supporting gas. The analyzer includes a background providing device for supplying a background component gas capable of emitting a characteristic spectrum having the same wave length as that of the characteristic spectrum of a measuring object component contained in the sample gas, the light spectrums emitted from the measuring object component and the background component gas being received and treated to be detected, thereby increasing the measuring accuracy for the measuring object component and improving the resolving power at a low concentration detection region.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the second burner of Isenberg into either of the devices and methods of Forbes and Von Drasek because of the ability to control the composition of the second or reference gas and measure the concentration of components in the exhaust relative to a composition or signal which is known leading to a method in which the control in enhanced because of the presence of a known signal as taught by Murase.

5. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Forbes or Von Drasek in view of Isenberg and Murase as applied to claim 13 above, and further in view of Wright, Jr. (US 5,708,507). Forbes and Von Drasek do not teach a temperature sensor.

In the patent Wright, Jr. teaches temperature resolved molecular emission spectroscopy of solid, liquid or gaseous materials. A sample is vaporized and decomposed, and the vaporous sample is transported into a combustion flame. An intensity spectrum of the optical emission from the flame at a selected wavelength versus temperature of the sample define molecular peaks which are characteristic of the sample material and allows both qualitative and quantitative analysis of the sample.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate a temperature sensor into the devices of Forbes and Von Drasek because of the ability to perform both qualitative and quantitative analysis of the sample as taught by Wright, Jr.

6. Claim 15 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The art of record fails to teach or fairly suggest the structure of claim 15.

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The additionally cited art relates to flame photometric detectors.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arlen Soderquist whose telephone number is (703) 308-3989. The examiner's schedule is variable between the hours of about 5:30 AM to about 5:00 PM on Monday through Thursday and alternate Fridays.

For communication by fax to the organization where this application or proceeding is assigned, (703) 305-7719 may be used for official, unofficial or draft papers. When using this number a call to alert the examiner would be appreciated. Numbers for faxing official papers are 703-872-9310 (before finals), 703-872-9311 (after-final), 703-305-7718, 703-305-5408 and 703-305-5433. The above fax numbers will generally allow the papers to be forwarded to the examiner in a timely manner.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Arlen Soderquist

September 29, 2003

ARLEN SODERQUIST
PRIMARY EXAMINER